Dijkstra Worksheet

Name:
NetID:
Signature:

1. What is the defining characteristic of a Max Heap? How can the characteristics of Heaps be used to implement a Priority Queue?

2. Suppose we have an array representation of a Binary Heap. Find the parent, left child, and right child of an element i.

3. How can you insert into a Heap? Assume the Heap is implemented as an array. Write some code!

4. Let's say you have a very important packet to send from your computer to another computer, find the shortest path from your computer to all other nodes in the computer network.

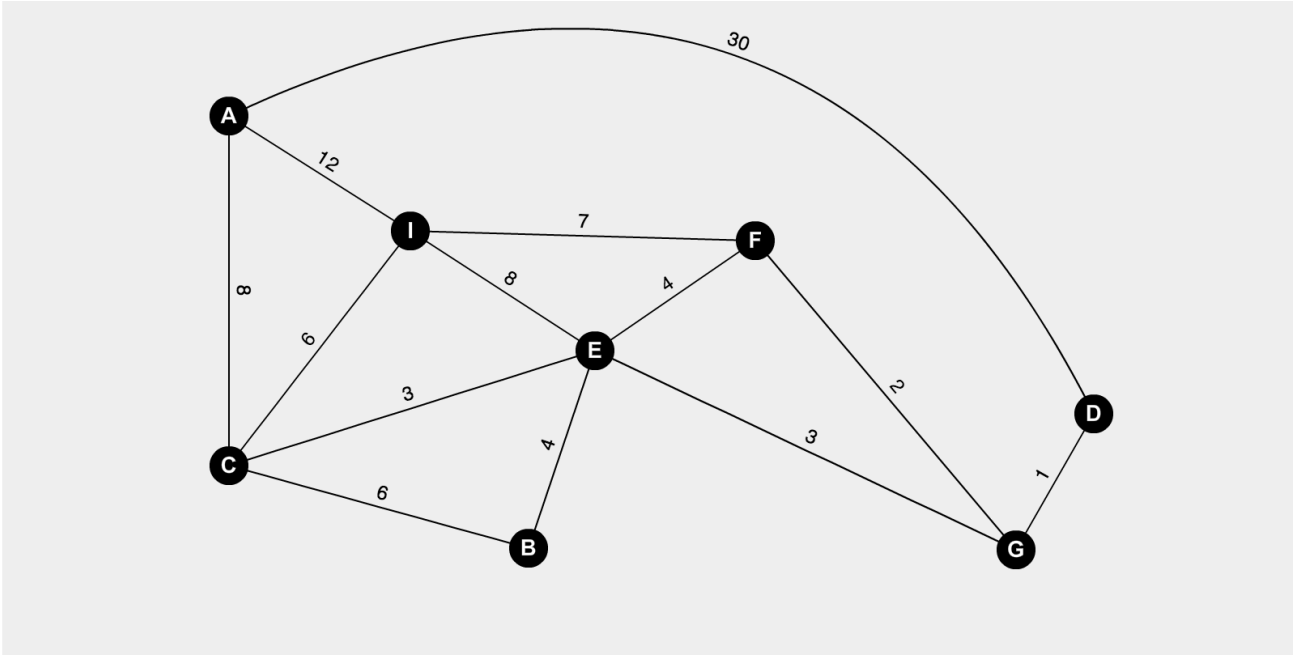
Here is Dijkstra:

```
def Dijkstra(Graph, start, end):
  PQ = Queue.PriorityQueue()
```

```
  foreach node in Graph:
    node.cost = infinity
  start.cost = 0
  foreach node in Graph:
    PQ.insert(n,node.cost)
  while not(PQ.empty()):
    u = PQ.extract()
    if u == end:
      break
    foreach neighbor v in u.neighbors:
      w = cost from v to u
      newCost = u.cost + w
      if (newCost < v.cost):
        PQ.decreasekey(v,newcost)
        v.cost = newCost
        v.predecessor = u


```

Here is a graph. Use Dijkstra to find the shortest path from A to all nodes in the graph. Go through iteration by iteration, update the costs, as well as u from the psuedocode. ∞



	u	A	B	C	D	E	F	G	I
1	A	0	inf	8	30	inf	inf	inf	12
2	AC	0	14	8	30				
3									
4									
5									
6									